MODIS Team Meeting Minutes

Minutes of the MODIS Team Meeting held on Tuesday, November 21, 1995.

Action Items:

113. Determine the best method to display a fixed pattern noise (herringbone, Spec 3.4.5.3.3). Assigned to Knight 8/15/95. Due 10/15/95.

115. Locate a Heliostat drive for the Solar Diffuser Test. Assigned to Barnes 11/07/95. Due 12/22/95.

Distribution:

✓ Richard Weber	Bruce Guenther	✓ Larissa Graziani
✓ John Bauernschub	George Daelemans	✓ Bob Martineau
✓ Rosemary Vail	Mitch Davis	✓ Bob Silva
✓ Lisa Shears	✓ Ken Anderson	✓ Robert Kiwak
✓ Mike Roberto	Rick Sabatino	✓ Harvey Safren
Gene Waluschka	Cherie Congedo	✓ Ed Knight
✓ Bill Barnes	✓ Jose Florez	Harry Montgomery
✓ Les Thompson	Gerry Godden	Marvin Maxwell
John Bolton	✓ Sal Cicchelli	Bill Mocarsky
		✓ Helen Phillips

The following items were distributed:

1) Weekly Status Report #216
2) SBRC Memos submission from week #208
3) Minutes of the previous team meeting

MODIS Technical Weekly November 24, 1995

sent to MODIS.Review 11/27/95 at about 11 am

1.0 Introduction

Welcome back from the Thanksgiving holiday!

The quarterly management review will be held Tuesday, December 12 at SBRC. If you plan to go, please get your travel orders in now.

This report covers from November 13 through November 26. There was no team meeting on November 14.

The science team informal gathering (because of the government furlough) was held November 14 through November 17. MODIS technical status was discussed ~~by Dick Weber, Tom Pagano~~, and ~~Bruce Guenther~~. MODIS Lite concepts were outlined ~~by Bill Barnes~~. At the Management Council meeting on November 20, Vince Salomonson noted that the major concern at this time is transient response of the instrument.

GSFC is sending a Jose Florez, Bob Silva, and Bob Cummings to SBRC and MALCO (the manufacturer of the MODIS connectors) for a couple of days, starting November 28 to review the MODIS connector problem. In this report, Jose provides details on the circuit card assembly connector problem.

Bob Martineau provides flight model detector status.

Gene Waluschka writes about MODIS Lite. In another email, he recommends that GSFC analytically model the SBRC setup for measuring the MODIS point spread function. Gene is in Russia for a two week vacation.

Ed Knight discusses MCST turnaround time for TAC analysis, with inputs from Jeff Bowser and Cindy Merrow on how quickly MCST could process TAC data received from SBRC. The bottom line from Ed is that he believes "we (MCST/Project) need to get SBRC to send us the data quicker and find the resources to develop analysis packages or we need to concede that GSFC will not independently review any MODIS test data in time to affect the instrument build or test program".

Ed Knight and Cindy Merrow raise additional issues on S/C level I & T, which they feel should be addressed in the next few months. These issues result from the Spacecraft Integration and Test workshop at Valley Forge on November 1. Cindy's email message on this topic is summarized here:

1) Instrument level testing at S/C level I & T may take longer than the current time allocations. It is recommended that the time allocations be computed based on SBRC estimates of test times and GSFC estimates of processing turnaround times.

2) Instrument trending on a weekly or biweekly basis should be considered, including concrete metrics for measuring performance stability.

3) The issue of SRCA bulb lifetime versus the need for external stimuli for MODIS could use some revisiting.

4) At present, there is a limited Uninterruptable Power Supply (UPS) which allows ten minutes to safe the S/C and power down. If this means there is no back-up generator, then a back-up generator is needed for safety and schedule reasons. Also, UPS should be required for the console and workstations.

5) We should request two offices or cubicle spaces on the third floor at LMAS for MCST space.

2.0 Bob Martineau (Flight Model Detectors)

email from Bob, 11/22/95
SUBJECT: Weekly Input for 11/21/95

1) Flight Model SCAs:

- Four SCAs have been successfully hybridized and are currently being mounted and wirebonded into test carriers. Four units were hybridized to yield 2.

2) Flight Model 1 Detective Assemblies and FPAs:

- The F1 VIS and NIR FPAs have been delivered.

- F1 LWIR testing is complete. Peeling on the filter mask coating was observed before mounting the filter/bezel assembly. Mary's recommendation is to scrap the mask and rebuild the filter with a new mask being built for F2.

- The F1 SMWIR DA is in radiometric test. It has the same 2 soft pixels as observed in the SCA data. One more pixel in a different band fails uniformity at Qhi. The response stability test is in process. The B26 replacement filter was received and the filter/bezel assembly was completed Nov 18. CTI is planned for 12/8.

3) Flight Model 2 Detective Assemblies:

- The F2 VIS and NIR FPAs have been delivered.

- The F2 SMWIR DA was wirebonded and will start radiometric tests this week.

- The F2 LWIR DA was also wirebonded and will be tested next.

3.0 Eugene Waluschka (MODIS Lite, Possible GSFC Simulation)

<EUGENE@C717.GSFC.NASA.GOV> at Internet
Date: 11/16/95 12:31 PM
Priority: Normal
Subject: Modis-lite comments
---------- Message Contents ----------
Folks:

Yesterday, at the MODIS SCIENCE MEETING, SBRC's concepts of a MODIS Lite were again discussed. There was some discussion from the science community about what the objectives should be. A hyper spectral approach at viewing the earth was mentioned. However, continuity of data and calibration was stressed, the first can be viewed as a money consideration and the second as a science requirement. The most discussed version of MODIS Lite is a slightly modified MODIS instrument. The discussion left me somewhat perplexed. The following list of questions and observations, in no particular order, do come to mind.

A hyper spectral instrument would be great, especially if we don't know what we are looking for. If we lock ourselves into trying to view the earth at (only) 36 wavelengths we are very probably limiting ourselves considerably. Atmospheric and ecosystem science has been around for about 100 years. The sun and the earth (as we know it) for about 4 billion years. I am will to bet that in that time relations have developed between the atmosphere, living things and sunlight which require more than 36 discrete wavelengths to see. Now I can get off of my soap box.

The MODIS Lite discussion stressed more form vs. function. How the instrument will work was stressed but not the quality of the product.

The MODIS Lite instrument (at least in its current form) never looks straight down. The earth is viewed along a series of arcs. This also means that testing at various scan angles will be awkward. As the Lite mirror rotates either the instrument or the test equipment must be moved. This means characterization will be even more difficult with the present design.

MODIS - Lite's near field response will be about the same as the current design. The scattering of light at the surfaces can be reduced but not by much unless we start thinking of super polishing every surface and

pay for expensive (non scattering coatings) and testing every surface and component before it is put together.

MODIS - Lite's far field response will be somewhat better but not by much. The best design would have a rotating telescope with a nice big tube (also rotating) to shield the optics from extraneous light. If we could replace the current MODIS scan mirror with a rotating telescope as in SeaWifs that would ideal for limiting the amount of far field seen by the optics and hence the far field stray light. That is a big IF, but it would improve the radiometric accuracy considerably without the need for image post processing (which - radiometricly- as yet has not been shown to work).

Filter cross talk will not be reduced by this approach. It is very likely that making good small filters is relatively easy, if testing and correcting are made well before the entire instrument is put together.

The longer wavelength channels are somewhat starved for light. Making the aperture smaller will only make matters worse.

Nothing was said about the instrument saturation (due to instrument radiation) at the longer wavelengths.

Now for the best part, the part where I get to lecture. The optical performance is fully specified with a knowledge of the point spread function (as a function of wavelength). We are at present trying to determine MODIS's point spread function primarily because of the possible need to correct for is broadening due to stray light. If we specify performance in terms of PSFs, we cannot (optically) go wrong. There is then a well know relation between object and image. Which is important when you are have more than one MODIS (Lite).

Author: Eugene Waluschka at 710
Date: 11/17/95 10:27 AM

Editor's Note: The subject for the referenced memo is point spread function near field response measurement methodology.

With regard to the following memo

2578 PL3095- N05335 Barnes Week 206

Let me say the following - what am I doing here. But as I am here I would like to suggest that we should simulate SBRC's proposed experimental setup and give predictions as to the results. This should be a detailed simulation starting at the source (filament) and stopping at a detector on a focal plane. We have most of the geometry already so that the task is not large and should take a couple of weeks. However, as with our simulation of the line spread function, which was more detailed than SBRC's, we should also learn something about MODIS. Having a working model of the experiment would help in interpreting the results and help us in filling in the missing or ambiguous data. Our models should be able to predict the near field results. Far field will require a bit more effort. Right now the only thing we have for the far field is Breault's results.

I'll be out on vacation for the next two weeks, in Russia. So see you later.

Eugene Waluschka

4.0 Jose Florez (Circuit Card Assembly Connector Problem)

Author: Jose Florez at 730
Date: 11/21/95 5:25 PM
Subject: Telecons with SBRC on CCA Connector Problem
---------- Message Contents ----------
Telecon with Ed Clement. 11/20/95 5:00 pm

The PCB connector issue continues to be the main issue to be resolved. Failure analysis disclosed that the problem stems from undercrimping internal to the connector, and potting compound in the backshell backfilling into the sleeve.

The manufacturer, MALCO/Microdot, built 184 crimps for evaluation by SBRC to determine whether the problem was lot related. One of the crimps failed during testing. After this failure it was decided that in addition to the 184 pin connectors, the 128 pin connectors will also be replaced.

The plan is to proceed with board testing all the way up to the point when the boards are ready for conformal coating and replace the connectors then. The connectors have to be removed from the boards by cutting the pins under the connector body to remove it. The pins are then unsoldered from the board one by one. Eighteen (18) of the MEM boards will also require modification of the T-bar for the connector replacement operation. The modification consists of milling-off insertion tabs.

The male connectors used in the backplane are currently undergoing temperature cycling to determine if they suffer the same problem. These connectors are fabricated using a different process from the females, so the problem is not expected.

The proposed solution at this point seems to be to solder the end of the sleeve to the wire after crimping. This will offer improved electrical and mechanical contact, plus a barrier to prevent potting from backfilling into the sleeve. Some of these connections have been made and are currently being tested.

Jose

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Telecon with Ed Clement. 11/21/95 5:00 pm

Testing of the crimped-and-soldered connections disclosed that there was wicking of the solder into the sleeve.

At this time SBRC has decided to make 23 new flight connectors using only the crimp. They intend to make a test crimp for every 10 flight crimps made for destructive testing.

Ed Schultz is the person that can give us the details.

Jose

5.0 Ed Knight (MCST Turnaround Time for TAC Analysis; S/C Integration and Test Issues)

Author: eknight@highwire.gsfc.nasa.gov (Ed Knight) at Internet

Date: 11/13/95 4:55 PM

Subject: MCST Turnaround Time for TAC Analysis

Attached is an email from Jeff Bowser and Cindy Merrow estimating how quickly we (MCST) could process TAC data when received from SBRC. These estimates are for the near field response, polarization, pattern noise, radiometric measurements, and spectral and spatial tests. We have identified all of these but polarization and pattern noise as "critical" tests, where GSFC may wish to have MCST's analysis completed quickly so that show stoppers are identified in time to influence deconfigurations/completion of test decisions.

These estimates allow us to make the following conclusions:

1. In order for MCST analysis to be timely for GSFC to influence SBRC's tests, SBRC will need to deliver the data almost immediately, or MCST will have to process data in parallel with SBRC, or both.

2. Processing estimates, based on previous experience are likely to be several hours to a day or so, instead of the few hours reported by SBRC on November 1. Note that our estimates are inherently conservative, which may explain the difference with Tom Pagano.

3. These processing estimates are independent of analysis time. Previous experience indicates that this can be substantial if it is to be thorough. MCST/SBRC should examine "quick" statistical packages or display packages such as developed by Dan LaPorte to improve analysis times.

I believe that we (MCST/Project) need to get SBRC to send us the data quicker and find the resources to develop analysis packages or we need to concede that GSFC will not independently review any MODIS test data in time to affect the instrument build or test program.

To: Distribution
From: J. Bowser, C. Merrow
Subject: Preliminary Process Turn Around Arguments
Date: November 13, 1995

This memo provides a preliminary cut at the turn around time for providing feedback to SBRC during Protoflight Model (PFM) testing for MODIS. The parameters and assumptions used for determining the turn around times were discussed with T. Zukowski for his inputs and they are defined below. The Engineering Model (EM) logbook was used as the source for estimating data volumes during PFM testing. The following is the timeline of events that we believe will occur for a particular test.

TIMELINE:

SBRC runs PFM Test
|
V
SBRC runs TAC routines
|
V
SBRC "ftp"s data to GSFC
|
V

GSFC prepares data for examination
|
V
GSFC runs GSFC TAC routines
|
V
GSFC analysis of results
|
V
GSFC response

Assumptions:

- The turn around estimates below are from the time that the data is "ftp"ed to GSFC through the GSFC response.

EM LOG CHART

The following chart is an examination of the EM log book. The number of perceived test runs are shown in parenthesis before the number of collects. The nominal number of collects is a straight average for all test runs. The critical tests (i.e. show stoppers) are shown with an asterisk by the TEST ID.

	AMBIENT	THERMAL VAC	
TEST ID	#COLLECTS	#COLLECTS	TAC ROUTINES
	nominal [max]	nominal[max]	
ALPC04*	(2) 60 [75]	(0)	NFR
ALPC08	(1) 37 [37]	(0)	Polarization
MFI-09	(1) 22 [22]	(0)	GAO,SNR,DN Disp
ALRC01*	(2) 43 [43]	(1) 82 [82]	RRC,ARC,GAO,SNR,RVS
ALRC02*	(2) 20 [22]	(2) 53 [60]	RRC,ARC,GAO,SNR,RVS
ALPC07*	(4) 27 [38]	(1) 8 [8]	Spectral
ALPC02*	(7) 36 [109]	(3) 109 [160]	Spatial,IFOV,MTF

RESPONSE TIMES

TEST ID	NAME	TURN AROUND TIME
ALPC04	Transient Response	1hr + 13hrs + analysis = 14hrs + analysis
ALRC01	Radiative Cal VIS..	1hr + 14hrs + analysis = 15hrs + analysis
ALRC02	Radiative Cal MWIR.	1hr + 10hrs + analysis = 11hrs + analysis
ALPC07	Spectral Coverage..	1hr + 6hrs + analysis = 7hrs + analysis
ALPC02	Spatial Performance	1hr + 27hrs + analysis = 28hrs + analysis

Assumptions:

- We will need one hour to setup for running TAC after arrival of data.

- We are using an average of 10 min per collect per routine processing time.

- We will process every collect, however, for some tests a single routine will not use all of the data in a collect. Therefore, for tests such as ALRC01, that may include 5 TAC routines, we will assume that a combination of routines will be run for a particular collect, i.e. effectively, one routine per collect.

- We have used the maximum number of collects (Ambient vs. Thermal Vacuum, where applicable) in order to provide a worst case estimate. It should be noted, however, that some tests may have higher data volumes in PFM testing and some less.

- We only calculated turn around times for the critical tests.

- We are assuming 1/2 day to 2 days for GSFC analysis.

- There will be an unknown overhead for any Special Test Requests (STRs).

Again, this is a worst case estimate. It's quite possible that in some cases processing will be more limited due to data filtering e.g. one out of every ten collects will be processed, and external time constraints.

Subject: Spacecraft Integration and Test Issues

Author: eknight@highwire.gsfc.nasa.gov (Ed Knight) at Internet
Date: 11/17/95 12:25 PM

On November 1, 1995, Cindy Merrow and I attended the Spacecraft Integration and Test workshop at Valley Forge with representatives from SBRC, LMAS, and GSFC. This meeting was very productive, with SBRC and GSFC learning much about the proposed test facilities and plans for AM-1. In addition, SBRC presented their first cut at the tests and test equipment they feel is required for spacecraft level integration and test. Many action items and issues were raised at this meeting which the relevant parties are pursuing.

In addition to the items previously identified in Claire Wilda's minutes, Cindy Merrow and I have had further thoughts on S/C level I&T issues. These are captured in Cindy's attached email. I concur with Cindy that these should be addressed in the next few months.

Ed,

The following is a reiteration of some of my comments regarding the 11/1/95 meeting at LMAS in Valley Forge, PA. I have also added additional comments after further review of the data packets from 11/1/95 and your S/C I & T file.

I reiterate that I was very impressed with the amount of preparation for S/C integration by LMAS (Claire Wilda) that has occurred at this point in the program. Having the S/C team address issues such as space, facility, cleanroom, TV chamber and test requirements at this early juncture is very beneficial for the overall planning effort. However, it also means that it may be harder for the instrument teams to change or add requirements at a later date.

I recommend that the items listed below be addressed in the near-term (next 2 months) to prevent any incorrect assumptions by the S/C team from being "set in stone".

1.) Instrument Test Requirements (Allotted Time) - Regarding tests at the S/C level such as Aliveness, Functional, CPT, etc., it appears that LMAS has already allotted times for those tests. Per pg. nkb-2 of the

fax from C. Wilda to E. Knight, dtd. 10/30/95, the allotted times for instrument Aliveness, Functional, and CPT are respectively 15 min, 4 hrs, and 8 hrs. From my experience with XTE, 8 hrs was about half of the amount of time typically required for an instrument CPT.

Estimates of the amount of time required to perform the MODIS instrument Aliveness, Functional, and CPT tests should probably be available from SBRC now since a Protoflight Model Test schedule has been established. I will assume that the LMAS allotted times did not include the amount of time required to process and analyze the data. Therefore, I suggest that the SBRC estimates of test times and the estimates of processing turnaround times as were provided to you in the memo from Jeff Bowser and myself, dtd. 10/13/95, be combined in order to derive required test times for Instrument tests at the S/C level.

Again, the longer the S/C Team believes that the Instrument Team only needs 8 hours for their CPT then the harder it will be to add time later especially if the I & T schedule slips.

2.) Instrument Trending - I've noticed from the data hand-out entitled "EOS-AM Integration and Test Facilities Summary" under Test Flows, pg. EDK-4, and I & T Schedule, pg. EDK-27, that between testing activities at the S/C level there may be a period of 1 month or more that the instrument will not be powered on or any data collected. I have also reviewed the MODIS Trend Analysis (List of Parameters To Be Monitored) - CDRL 111 and it states in the first paragraph that "The parameters to be monitored will be only those within the established test framework. No testing will performed for the sole purpose of monitoring performance stability." This document also provides two tables that list the parameters to be monitored that relate to Spectroradiometric and Spatial stability. However, I have found that these tables fail to provide any concrete metrics for measuring performance stability. Given that and the fact that this document was prepared in January '94, MCST and SBRC should probably re-examine the parameters to be monitored for trending and the method for monitoring the parameters i.e. "within the established test framework".

Based on my experience from XTE I have difficulty believing that the instrument teams have not required that trending tests be performed either on a weekly or bi-weekly basis for the following two reasons:

a. The performance stability of the instrument needs to be monitored in order to ensure that the science requirements are still being met. For two of the instruments on XTE, trending on a weekly basis became very valuable in detecting small changes in instrument conditions such as changes in Xenon pressure which if not detected early enough could have led to detector degradation or a lost opportunity for a detector change-out. As a result the early detection allowed for detector rework and/or replacement. The instrument teams benefited from the trending by being able to ensure that they were flying the best set of detectors.

b. The potential for catastrophic failures exists of which trending will facilitate detection of the early warning signals. For example, during the instrument level testing of the third instrument on XTE, the instrument team discovered that the detectors were susceptible to leaks. The detector's performance would begin to degrade upon exposure to humidity due to a leak after only a few days. If left exposed to the humidity for more than a few days the failure could become catastrophic, therefore, trending on a weekly basis was required by this instrument team.

3.) External Stimuli - I understand that there are no current plans for external stimuli for MODIS, except for the possibility of using the BTC during ambient tests which is still under investigation. However, I don't believe that the issue with SRCA bulb lifetime is closed yet. In your memo entitled "Revised SRCA Use during S/C Integration and Test, dtd. 2/6/95, you stated that it may be possible to use the SRCA to test

the reflective bands but maybe not entirely desirable. The amount of uncertainty about bulb lifetime that will be used at LMAS doesn't appear to have been resolved either. This issue probably warrants a re-visit before the use of external stimuli is entirely ruled out.

4.) Back-up Generator and UPS - In the meeting minutes from the 11/1/95 meeting at LMAS, E. Keeling stated that there is a limited Uninterruptable Power Supply (UPS), therefore, when power is interrupted we safe the S/C and power down within 10 minutes. I gleaned from this that there is no back-up generator system. If so, this does not seem very efficient nor wise especially during TV. If the power is interrupted during a cold soak in TV, I don't believe that one would want to power off the S/C not knowing if the S/C tempertures were getting colder or having any information regarding the S/C's health and safety. Additionally, by not having a back-up generator, does this mean that we accept the risk of not being able to maintain vacuum and temperature and the associated schedule hits to return to the appropriate temperature and vacuum.

Also in V. Alferd's presentation from 11/1/95 entitled "MODIS Integration at the LMAS Valley Forge Facility" it states that UPS power is PREFERRED for both console and workstations. I recommend that UPS power be REQUIRED. UNIX Systems load the processes and data that are currently being used into RAM. Those items in RAM are lost if power is suddenly removed. Portions of the operating system may be corrupted which would require some time to restore and may interfere with valuable test time.

5.) Space for IGSE - From my viewing of the space for the IGSE and looking at the diagram in the "EOS-AM Integration and Test Facilities Summary" hand-out that indicates that 150 sq. ft has been allocated for MODIS, I don't believe that this is sufficient space if two offices are also located in that same 150 sq. ft space. I suggest that we request two office or cubicle spaces for MCST on the third floor, if not for overflow reasons then for a quiet spot for small meetings, data review, etc.

Let me know if you agree or disagree with these items and how I should proceed where there is more work to be done.

Thanks,

Cindy

MR
11/27/95